Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
Expanding the Economic and	)	GN Docket No. 12-268
Innovation Opportunities of Spectrum	)	
Through Incentive Auctions	)	

COMMENTS OF NOKIA SIEMENS NETWORKS US LLC

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Comments of Nokia Siemens Networks US LLC

Nokia Siemens Networks US LLC ("Nokia Siemens Networks") hereby responds to the Commission's *Notice of Proposed Rulemaking* ("*NPRM*")[1] seeking comment on the voluntary incentive auction process that will be employed in order to repurpose television broadcast spectrum for mobile broadband use pursuant to the Middle Class Tax Relief and Job Creation Act of 2012 ("Spectrum Act").[2] As a leading global supplier of mobile broadband network equipment and solutions, Nokia Siemens Networks has championed the use of all available means, including voluntary incentive auctions, to help identify and allocate additional spectrum to assist in meeting the ever-growing bandwidth requirements of wildly popular mobile broadband services. The existence of the growing spectrum shortfall has been widely acknowledged, from the Commission to the U.S. Congress and beyond, and the near future impact on consumers and the U.S. economy lamented. This proceeding represents an exceedingly rare opportunity to bring to market a potentially significant amount of highly valued spectrum that is ideally suited for licensed, wide area mobile broadband services. Nokia Siemens

[1] *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, Docket No. 12-268, FCC 12-118 (rel. Oct. 2, 2012) ("*NPRM*").

[2] *See* Middle Class Tax Relief and Job Creation Act of 2012, Pub. L. No. 112-96, §§ 6402, 6403, 6407, 125 Stat. 156 (2012) ("Spectrum Act").

Networks thus strongly supports the Commission's efforts and offers some insights in the comments that follow to assist in the ongoing development of a framework for maximizing the use of this important spectrum for mobile broadband services.

I. INTRODUCTION

Nokia Siemens Networks is the world's specialist in mobile broadband. Innovating at the forefront of each generation of mobile technology, Nokia Siemens Networks provides the world's most efficient mobile networks, the intelligence to maximize the performance of these networks, and the services to make it all work seamlessly. Nokia Siemens Networks is leading the commercialization of Long Term Evolution (LTE), both FDD LTE and TD-LTE, in terms of commercial references[3] and live network performance.

The pressing and growing need for additional spectrum to support the unparalleled rise of demand for mobile broadband connectivity has been well documented by the Commission and many others. A recent study by Deloitte contends that the implications of not making additional spectrum available for mobile networks will include consumers experiencing reduced performance in terms of lower throughput speeds as well as problems accessing networks and dropped connections.[4] A wireless service provider in fact may even become forced to resort to steps such as lowering speed performance simply to ensure all of its subscribers can have some level of network access. Clearly a major reason for such developments is the continued uptake in

[3] As of January 25, 2013, Nokia Siemens Networks had 73 commercial LTE agreements in place. Out of these, 26 operators have already commercially launched LTE and serve about 40% of all LTE subscribers worldwide.

[4] *Technology, Media and Telecommunications Predictions 2013*, Deloitte, *available at* http://www.deloitte.com/assets/Dcom-Australia/Local%20Assets/Documents/Industries/TMT/Deloitte_TMT_Predictions_2013_18Jan2013.pdf.

smartphones and tablet devices, as a smartphone today can drive some 35 times more traffic than a standard mobile phone.

Nokia Siemens Networks anticipates that by 2020 a typical user could be consuming a gigabyte (GB) of data per day.[5] Driven in particular by rapid growth in mobile video streaming, downlink data traffic is expected to continue to exceed uplink traffic. Exceptions exist during certain events and in particular locations, however, such as with last year's National Football League Super Bowl when uplink traffic at the stadium reportedly surpassed downlink traffic.

There is little question that the mobile broadband networks of today are not prepared to meet the challenge of supporting the level of demand predicted for the not-so-distant future. Without question, however, the wireless industry is investing significantly in preparing for this exponential growth in data traffic. The first component of meeting this demand is improvements in the performance of mobile broadband networks. Research into, development and implementation of advances in technology are expected to continue delivering significant efficiency increases at comparable cost levels with the technologies of today. Innovation in mobile broadband technologies is demonstrated by HSPA with its continuing evolution, LTE and emerging LTE-Advanced. Research is underway on 'Beyond 4G' technology.

Expanded deployment of network infrastructure is also part of the solution. Further deployment of macro cells in existing and new wireless networks can be expected to extend coverage. Meanwhile, as much of the data use is expected to occur indoors and in hot spot areas,

[5] *See* Infographic: Mobile Broadband 2020 at http://blogs.nokiasiemensnetworks.com/mobile-networks/2011/09/27/infographic-mobile-broadband-2020/.

massive deployments of small cells close to the actual demand for the traffic are expected to help meet capacity requirements.

However, technology improvements and densification of the mobile networks alone will not meet the demand challenge. Spectrum as a finite resource remains an ongoing constraint which will escalate as demand growth will far outpace gains in technology and network design. Access to significant sources of additional spectrum thus is critical. The time required to allocate and ultimately put spectrum to use is quite lengthy however, and therefore a reasonable sense of urgency is called for, while respecting the complicated nature of proceedings such as this one.

The Commission has long recognized the looming spectrum shortfall, as evidenced in the National Broadband Plan[6] and subsequent pronouncements, and echoed by U.S. President Barack Obama in his Administration's Wireless Innovation and Infrastructure Initiative.[7] Both set a target of making available at least an additional 500 MHz of spectrum for mobile broadband use by 2020 and included voluntary incentive auctions as one of the tools that could be employed. The U.S. Congress agreed with the need for additional spectrum for mobile broadband, and responded in the Spectrum Act by including as a central component incentive auction authority for the Commission to make available a large amount of spectrum in the 600 MHz UHF television band for such use. In particular, Congress recognized the perfect match between the need for exclusively licensed, flexible use spectrum to support wide area mobile broadband services and ideally suited 600 MHz spectrum and structured the Spectrum Act accordingly. Nokia Siemens Networks accordingly urges the Commission to move forward with

[6] Federal Communications Commission, *Connecting America: The National Broadband Plan*, March 2010, *available at* http://www.broadband.gov/plan/.

[7] White House Wireless Initiative, 2011, *available at* http://www.whitehouse.gov/the-press-office/2011/02/10/president-obama-details-plan-win-future-through-expanded-wireless-access.

designing an auction framework that maximizes the amount of 600 MHz spectrum that can be made available for licensed mobile broadband services.

II. THE COMMISSION SHOULD PURSUE AN AUCTION FRAMEWORK THAT WILL MAXIMIZE THE AMOUNT OF SPECTRUM MADE AVAILABLE FOR LICENSED MOBILE SERVICES

Consistent with Congressional intent in the Spectrum Act, the amount of spectrum that is to be auctioned for licensed commercial use should be maximized, both to help address the need for spectrum for mobile broadband services and to ensure the realization of Congressional objectives such as the funding of a nationwide public safety network and reducing the national budget deficit. The auction framework must strongly encourage participation by broadcasters (particularly in the major markets), provide an ultimate band plan that maximizes the amount of licensed spectrum made available, and ensure that new and existing licensed services are protected from potential harmful interference.

The statutory structure of the incentive auction as a one-time opportunity amplifies the importance of it being a success. Nokia Siemens Networks strongly encourages the Commission to continue and even expand outreach to the broadcast television community to fully explain the incentives for participation and demystify the process. Limited broadcast licensee participation in the reverse auction would clearly reduce the likelihood of success of the overall auction or, at a minimum, severely under deliver on its potential impact. In particular, the Commission should maintain an acute focus on major markets where the mobile broadband spectrum demand will be highest. In terms of the repacking of remaining broadcast licenses, Nokia Siemens Networks urges the Commission to be aggressive and flexible. While the Commission unquestionably needs to protect continuing broadcasting operations, at the same time, a significant amount of

discretion is written into the Spectrum Act in order to help ensure that as much spectrum as possible is made available.

III. BAND PLAN CONSIDERATIONS

Nokia Siemens Networks at this time is not endorsing any particular band plan for the to-be repurposed broadcast television spectrum. However, below are general principles for consideration as well as some preliminary technical observations on issues raised in the *NPRM*. A great deal of further analysis by the Commission and interested stakeholders will be necessary as the proceeding moves forward.

As previously expressed in these comments, the Commission should seek to maximize the amount of spectrum to be made available for exclusively licensed, flexible use spectrum that can support the provision of advanced mobile broadband services and the band plan should reflect this. It should also be structured to minimize the likelihood of harmful interference scenarios for new and existing licensed spectrum users. It should support, at a minimum, the performance and size characteristics of smart devices and tablets in use on the mobile networks of today. To the extent possible, the band plan should promote as much certainty as possible for potential forward auction participants. Finally, consideration should be afforded to how best the band plan can help move the global commercial mobile broadband ecosystem forward, in terms of promoting economies of scale for the network and end user equipment markets.

Nokia Siemens Networks support the Commission's proposal to license the 600 MHz band in 5 MHz "building blocks."[8] This is logical and consistent with other commercial mobile spectrum allocations.

A. Duplex Gap Sizing

The Commission seeks comment on the appropriate size and specifics of a "duplex gap."[9] To separate the uplink and downlink operations in a frequency division duplex (FDD) scenario, the minimum amount of spectrum in a duplex gap should be at least 10 MHz. This is also the duplex gap implemented in the 2 x 45 MHz Asia-Pacific 700 MHz band plan after study.[10]

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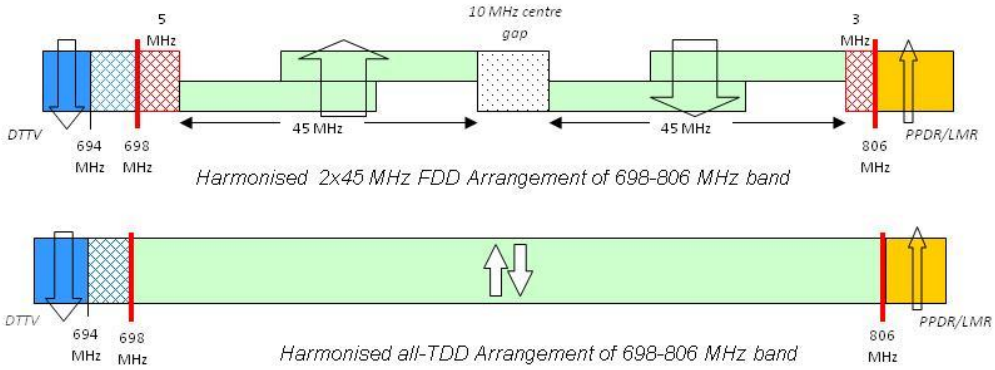

Figure 1: Asia Pacific 700 MHz band plans (FDD and TDD variants)

An overlapping two duplexer solution is also implemented in the device to support the Asia-Pacific 2 x45 MHz band similar to some of the proposals that the Commission is

[8] *See NPRM* at ¶ 125.

[9] *Id.* ¶ 167.

[10] Reports *available at* http://www.apt.int/AWF-RECREP.

considering in this instance depending upon the available spectrum. Note that the Asia-Pacific 700 MHz band plan is offered here as a reference point independent of the 600 MHz band plan the Commission chooses to advance. The widest FDD filter so far is a 3GPP Band 3 (1710-1785 uplink/1805-1880 MHz downlink) duplexer with 4.2% relative bandwidth. This is close to the technology limit but it is worth investigating if this can be improved if other requirements for the filter are not very stringent. A 5% relative bandwidth could be a starting point, making the filter bandwidth between 25-30 MHz, if confirmed by device filter vendors.

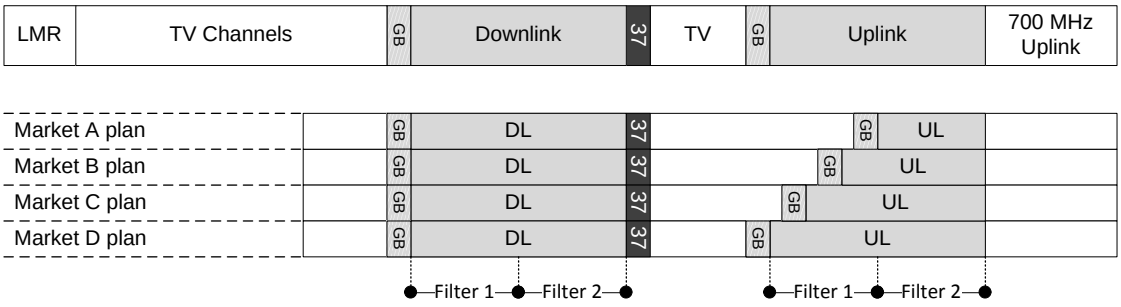

Figure 2: Example of FCC family requiring two filters

The Commission should not authorize any use of a duplex gap that is likely to cause harmful interference to adjacent licensed users. For instance, if unlicensed use in the duplex gap would cause any potential harmful interference to licensed operations outside of the duplex gap, it would require guard bands that would not allow the FCC to maximize the amount of spectrum to be made available for licensed mobile broadband. Moreover, if TV operations are allowed in the FDD duplex gap and the mobile transmissions start at channel 51 and expand downwards toward channel 37, this could create intermodualtion products between the TV transmissions and the mobile transmissions that fall in the mobile receive band. Assuming confirmation of this issue, the Commission might look at the different frequency allocation combinations that could

give rise to this problem and minimize or eliminate such combinations. To minimize this potential problem, the FCC could try to avoid any TV transmissions in the FDD duplex gap when designing the band plan and try to relocate as many remaining TV channels as possible to the lower part of the spectrum below channel 37 and fill in all of the band above channel 37 with mobile broadband.

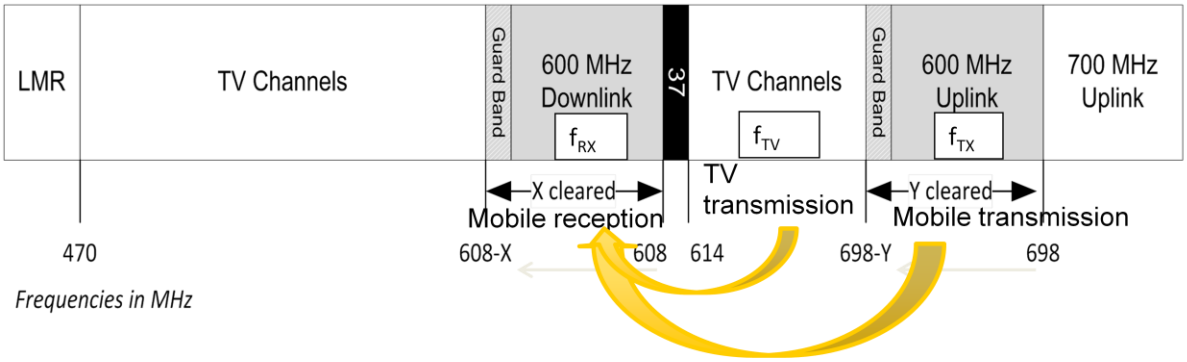

Figure 3: Example of Intermodulation: $f_{RX} = 2xf_{TV}-f_{TX}$

Pioneering and spearheading LTE development, Nokia Siemens Networks has made a long-term commitment to both the FDD and TDD modes of operations for LTE. The Commission seeks comment regarding TDD use in the 600 MHz band.[11] Should the Commission consider both FDD and TDD in its band plan, the allocation should be done in a structured manner so that spectrum is used efficiently and guard bands are minimized. Interleaving of FDD and TDD blocks in a random manner is not recommended as it will require guard bands at each FDD/TDD frequency border. The guard band between FDD and TDD blocks would need to be studied carefully and is usually a trade-off of product and filter performance, geographical isolation required between those systems, and other considerations. The Commission also asks

[11] *NPRM* ¶¶ 183-84.

about the need for guard bands between TDD blocks.[12] If TDD-based operators do not synchronize their transmissions via GPS for instance and align their downlink and uplink transmissions with each other, the scenario could become the same as an FDD block adjacent to a TDD block and therefore require similar mitigation techniques in terms of guard bands, filters, site engineering, and other measures. Guard bands between FDD or TDD and TV channels, third order intermodulation interference into the PCS and AWS band, and other technical issues should also be factored in when designing the band plan.

Nationwide uniformity in the band plan would be ideal, but the amount of spectrum that will become available certainly will vary by location. As a result, the adopted band plan must be flexible enough to accommodate such differences. One possibility is to define a consistent minimum allocation of spectrum that would be available nationally.

Nokia Siemens Networks urges the Commission to plan the relocation of Channel 51 incumbent users to alternative channels.[13] This will address interference concerns between Channel 51 and the lower 700 MHz A Block. Such action should allow the A Block to finally be put to meaningful use.

The existing uses in Channel 37 could be permitted to remain,[14] but Nokia Siemens Networks cautions against inadvertently affording such users greater protection than they enjoy today, with the potential of impacting the use of nearby spectrum for commercial services.

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[12] *Id.*

[13] *See Id.* ¶ 165.

[14] *See Id.* ¶ 122.

B. Third Order Harmonics Interference

Third harmonic interference could exist at three times the fundamental frequency of the transmissions. As such, the AWS and PCS bands become candidates for third harmonic interference from transmission in the 600 MHz band. It can be caused by the fundamental signal undergoing non-linear transformation. Third order harmonics of the transmissions in the following TV channels could cause third order intermodulation interference into the following AWS and PCS bands:

Scenario 1: TV channels 30-33 into AWS1 Uplink

Scenario 2: TV channels 38-42 into PCS Uplink

Scenario 3: TV Channels 42-46 into PCS Downlink.

As with all interference issues, it is necessary to understand the conditions under which the interference could occur, how critical the issues are and what the impact is on the product and system performance. Scenarios 1 and 2 are expected to be more of an issue when a 600 MHz FDD or TDD downlink transmission (Base Station or "BS" transmit) occurs in the mentioned TV channels and interferes with AWS and PCS uplink bands (BS receive) respectively. Scenario 3 is expected to be more problematic in the case of a 600 MHz FDD or TDD uplink transmission (Mobile transmit) and PCS downlink receive (Mobile receive) simultaneously inside the same device. Best practices exist in the industry to deal with many of those issues via system design and deployment. For instance, when the issue is between 600 MHz BS transmit and PCS or AWS BS receive, antenna and cabling sharing could be avoided.

However, the issue is more complicated when it occurs inside of a device. For instance, if a 600 MHz mobile transmits in TV channels 42-46 and is receiving on a PCS downlink band inside the same device (as could occur via carrier aggregation), intermodulation interference

could be an issue due to the proximity of the transmitter and receiver within the same device. This situation is similar to the 3GPP Band 4 and Band 17 Carrier Aggregation scenario where Band 17 uplink transmissions (704-716 MHz) generate third order harmonics (2112-2148 MHz) that fall into the Band 4 Receiver (2110-2155 MHz). This forces difficult receiver front end requirements and degradation of performance. For instance, 3GPP is working on the Band 4/Band 17 Carrier Aggregation scenario and discussing allowing up to 10 dB desensitization when Band 17 uplink is implemented in the same device as Band 4 downlink. Avoiding simultaneous use of the two bands inside a device would mitigate the issue.

It is believed that the same issue could occur between a 600 MHz device and a distinct PCS device but since the two devices need to be operating under very specific conditions for interference to occur (e.g. being separated by one meter or less, the PCS device receiving a poor signal, and the 600 MHz device transmitting), this interference between two devices may be less difficult to mitigate than interference inside of a single device.

One potential means for the Commission to mitigate this interference issue is to allow the operators to select their 600 MHz blocks based on their AWS and PCS holdings. Exchanges of spectrum between operators can also mitigate the issues.

C. Discussion of Guard Bands

The Spectrum Act authorizes the Commission to establish guard bands in its 600 MHz band plan that are "no larger than is technically reasonable to prevent harmful interference between licensed services outside the guard bands."[15] The clear direction is that the first priority

[15] *See Spectrum Act* at § 6407(a), (b).

is to maximize the amount of spectrum allocated for licensed commercial uses while protecting against potential harmful interference.

In seeking comment on guard band considerations, the Commission asks for analyses of interference between TV operations and proposed 600 MHz wireless systems. The Asia-Pacific Telecommunity (APT) Wireless Forum (AWF) studied extensively the interference between LTE and TV. This section presents a sample of the findings and conclusions of the interference study[16] from DTV transmission into IMT receivers. The reverse scenarios of interference from IMT into DTV receivers were also studied but are not presented here.

Case	***Interference Scenario***	***Observations***
1A	DTV Tx ⇨ IMT Base Station Rx	Critical case: high-site to high-site, LOS path
2A	DTV Tx ⇨ IMT UE Rx	Critical case: high-elevation urban/fringe DTV Tx sites

Table 1: Interference Scenarios Considered

Case 1 applies to an FDD uplink spectrum or TDD in adjacent spectrum blocks to TV transmissions.

Case 2 applies to an FDD downlink spectrum or TDD in adjacent spectrum blocks to TV transmissions.

[16] *HARMONIZED 700 MHZ BAND PLAN FOR REGION 3: DETAILED GUARD-BAND AND STRUCTURAL ISSUES*, Contribution to AWF UHF Correspondence Group by Telecom NZ, Telstra Corporation Ltd, Nokia, Nokia Siemens Networks, Alcatel-Lucent, Qualcomm, Samsung, and Ericsson.

These studies have also included consideration of the two interference mechanisms potentially arising in each case:

a) In-band interference to the victim receiver, due to out-of-band or spurious emissions of an interfering transmitter causing Rx desensitisation; and

b) Out-of-band interference to the victim receiver, due to insufficient selectivity in the victim receiver resulting in Rx 'blocking.'

These interference mechanisms are illustrated in the following Figures, respectively:

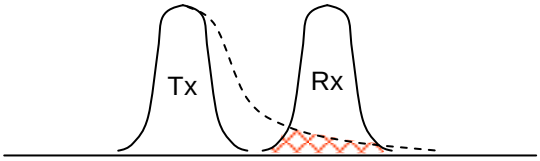

Figure 4.1: In-band Interference (ACLR)

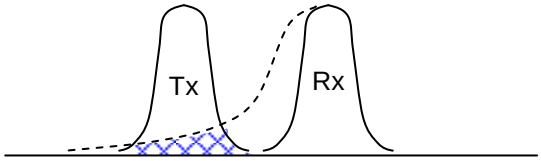

Figure 4.2: Out-of--band Interference (ACS)

The propagation models applicable to each case are copied below:

Case	***Interference Scenario***	***Model Adopted***	***Comments***
1A	DTV Tx → IMT Base-station Rx	ITU-R P.1546	LOS: high- to medium-elevation
2A	DVB Tx → IMT UE Rx	ITU-R P.1546	Longer-range, high-elevation Tx, cluttered Rx environment

Table 2: Assumed Propagation Models

Note that the IMT system ACLR and ACS parameter values used in these studies are in accordance with current 3GPP LTE specifications, and do not include any additional margins. While both the European DTV standards DVB-T and US standard ATSC parameters were mentioned, the DVB-T parameters were mostly used in the study. While we acknowledge that

the DVB-T parameters are different from US ATSC standards, we thought it would be useful to the Commission to see the conclusions from this Asia-Pacific study on guard bands.

Summary of System Parameters of DTV; DVB-T & ATSC

DTV(DVB-T) Values			DTV(ATSC) Values
	Tx power	Min. height to meet coverage target	92.15dBm/6MHz (1MW/6MHz(ERP)) ·ref. FCC part73.622
Set 1	75.15dBm(1)	190m	300m (Minimum height defined in FCC part73.622)
Set 2	85.15dBm	300m	
12dB *ref: BT.1368.8 (Feeder loss : 5dB)			12.2dB *ref: BT.1368.8 (Feeder loss: 5dB)
6 and10m			10m
EN 300 744			ATSC Standard Rev. A

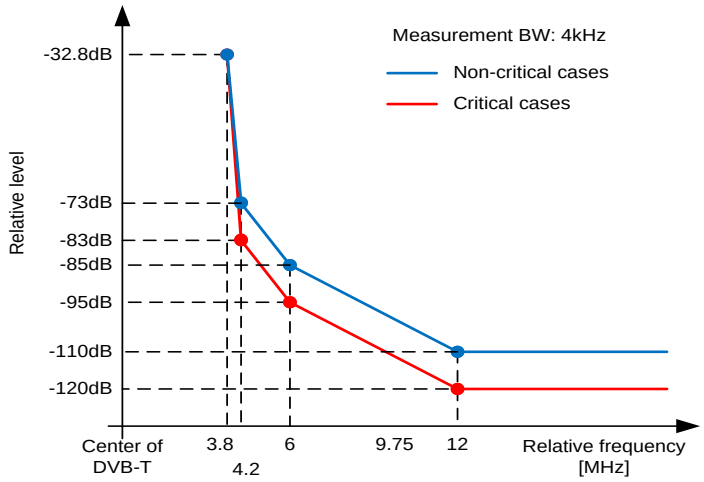

Figure 5.1: DVB-T Emission Mask (EN 300 744)

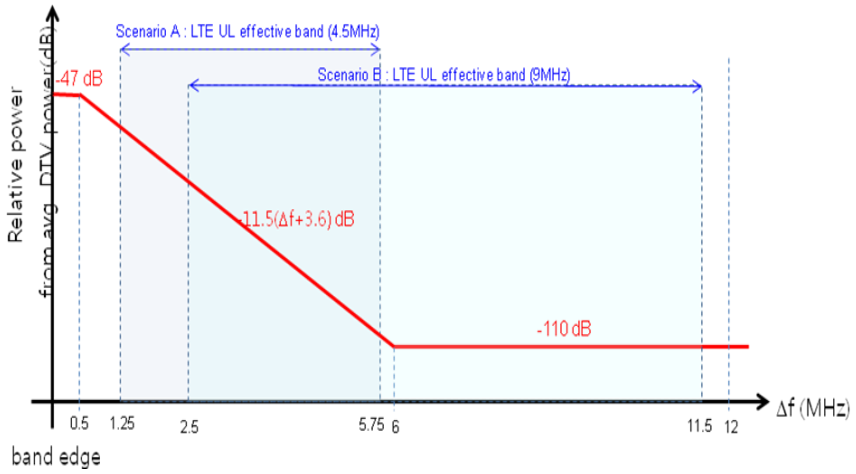

Figure 5.2: ATSC Emission Mask (Standard Rev. A)

The following observations were derived from this analysis:

5-6 MHz guard band

i) On *conservative* assumptions, if a guard-band of 5~6 MHz is implemented, further improvements are clearly needed for Case 1A (*DTV Tx interference into IMT base station Rx*), but the issue seems resolvable if actual IMT base station duplexing filters can provide 40~50 dB roll-off at a 10 MHz offset and additional out-of-band filtering is fitted to DTV transmitters.

ii) In contrast, for Case 2A (*DTV Tx interference into IMT UEs*) the critical issue is IMT UE Rx (ceramic 'chip' filter) selectivity performance – and the limited (if any) scope for further improvement is reduced. IMT UEs are frequently used in outdoor locations, where the propagation path from high-elevation DTV transmitters may involve minimal clutter. Thus, IMT downlink degradation could exist around DTV transmitter sites over a range of several km for IMT downlinks, despite the sizable guard-band allocation.

9 MHz guard band

i) The required additional isolation values for interference Case 1A (*DTV Tx interference into IMT base station Rx)* are further improved.

ii) The required additional isolation value for interference Case 2A (*DTV Tx interference into IMT UEs*) sees modest improvement of between 7~14.5 dB. Again, in this case the critical issue is IMT UE Rx selectivity performance – and the limited (if any) scope for further improvement. IMT coverage 'degradation zones' could exist over several km around DTV transmitter sites, especially for larger IMT downlink channels (e.g., 20MHz).

Therefore, while **Case 1A,** is likely to be largely resolved by allocation of a guard-band of 5~6 MHz, and fitting of suitable filters to DTV transmitters and IMT base stations, **Case 2A** remains unresolved despite the insertion of a 9 MHz guard band..

It is to be noted that the *DTV Tx interference into IMT UEs* interference is limited by the IMT UE selectivity. However, this issue also depends on the TV transmit power and deployment. Some of the mitigation factors could include:

- Avoid assigning TV channels in adjacent blocks to downlink spectrum in urban areas
- Restrict IMT carrier to 5MHz at the edge of the band which is closest to the TV transmissions
- Improve IMT UE Rx filters taking into consideration the cost impact.

The Spectrum Act states that the FCC "may permit use of such guardbands for unlicensed use."[17] It is important to understand, however, that this discretion clearly has limitations as it must be read against the first priorities of the statutory provisions and so understood as a secondary objective. As a result, it is imperative that any consideration of permitting unlicensed use ensures that it will not impede the maximization of licensed spectrum or compromise the licensed uses in terms of potential harmful interference.

[17] *Spectrum Act* at § 6407(c).

IV. COMMENTS ON OTHER SELECTED ISSUES IN THE NPRM

- Nokia Siemens Networks agrees with the Commission's proposal to largely base the new service rules for the 600 MHz band on those used in the lower 700 MHz band.[18] This includes proposed regulations regarding out-of-band emission (OOBE) limits,[19] the power and field strength limits adjusted for 600 MHz operations,[20] and other C.F.R. Part 27 general rules.[21] The commercial wireless industry has become familiar with such rules that aim to balance flexible spectrum use with protecting adjacent users from interference. As a result, assuming the absence of contradictory findings, it would appear appropriate to base the rules in this instance with those that generally are acceptable in other spectrum bands.
- Nokia Siemens Networks agrees with the Commission that three years is too long to transition the UHF band to broadband wireless use, and therefore encourages the adoption of policies that could make the transition as quick as possible.
- Nokia Siemens Networks supports flexible policies for the secondary market that can enable spectrum to flow to its highest and best use, including the aggregating of spectrum blocks.[22]
- On the issue of performance requirements and build-out timelines for future 600 MHz licensees,[23] the Commission should take into account broadcast repacking and the process

[18] *See NPRM* at ¶ 185.

[19] *See id.* ¶¶ 186-191.

[20] *See id.* ¶¶ 192-194.

[21] *See id.* ¶¶ 195-198, 376.

[22] *See id.* ¶¶ 387-391.

of vacating channels. As was the case with AWS and 700 MHz spectrum, the build out deadlines should be based on the actual date the licenses are cleared.

- Nokia Siemens Networks agrees with the Commission that international coordination is a very important component of this process. As issues of cross-border coordination with Canada and Mexico will have to be addressed,[24] Nokia Siemens Networks encourages the Commission to engage in timely discussions with its counterparts in both countries to proactively put the necessary processes in place to avoid these issues becoming an impediment to the timely conduction of the auction and utilization of the spectrum by new licensees.
- To the greatest extent possible, the Commission should be forward-looking in considering the potential for harmonization of this spectrum from a regional and global perspective. The industry is challenged by the continually rising number and variety of LTE band combinations. This is an impediment to achieving economies of scale in the equipment market, and its impact is felt through long product development cycles and higher costs passed on to consumers.

[23] *See id.* ¶¶ 395-405.

[24] *See id.* ¶¶ 172, 197.

V. CONCLUSION

The outcome of the voluntary incentive auction for 600 MHz spectrum is absolutely critical to the future of advanced broadband wireless networks in the United States. The amount of spectrum that is available today will very quickly prove woefully inadequate to support the continually rising national appetite for mobile data consumption. This proceeding represents an important opportunity to make available a potentially significant chunk of highly valued spectrum that is ideally suited for licensed mobile broadband services. Nokia Siemens Networks is pleased to offer the preceding initial comments and is committed to engaging with the Commission as it moves forward with this critical task.

Respectfully submitted,

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